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Final Report from Study Group on Universal Communications Technologies

—Starting up for "Value Evolution in Intelligence"

Background and outline of investigation

There are expectations that the realization of a ubiquitous network society in which it will be possible to connect to networks "anytime, anywhere, by anything, and anyone" will overcome social issues such as a lower birthrate and aging population, strengthen international competitiveness, and develop new values. MIC is currently actively promoting its u-Japan Policy in expectation of the realization of such a ubiquitous network society.

The word that has been used for the existing type of communications is "telecommunications" and it made possible the transmission and sharing of information over distances. It is expected that the anticipated arrival of a ubiquitous network society will build mutual understanding and collaboration between people through networks, and bring about an environment in which greater value will evolve.

In order to investigate new types of communications through a ubiquitous network society, MIC set up the "Study Group on Universal Communications Technologies" on April 27, 2005, and the group has since been continuing its investigations. The Group has been investigating domestic and overseas trends in universal communications technologies, usage images, R&D themes and policy measures for the realization of universal communications. The Group recently produced its final report, which is presented below.

Concept of universal communications

In order to bring about a new type of communications, which will build mutual understanding and collaboration between people and evolve higher value through networks, there are certain communications barriers that have to be overcome. These include (i) overcoming barriers of languages, culture and physical availabilities, (ii) natural expressions and transmission of visual information and sound, and (iii) creation of safety, reliability, sympathy and deep emotions that come with sharing an emotional aim or atmosphere.

The type of communications which will overcome these barriers is defined as "universal communications". Universal communications will allow people who have different languages, cultures, values, knowledge, experiences and physical abilities to recognize such differences not as barriers but as a strong uniqueness of each individual

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—without being aware of the existence of and burdens put upon the use of information communications devices—and to transmit and share information smoothly, resolve problems, and evolve new value in intelligence through mutual understanding and collaboration

Technologies to realize universal communications

In pursuit of realizing universal communications, the R&D, standardization, and commercial use of technologies in the following four fields are required.

Universal contents creation/distribution technologies

Technologies that realize an environment that allows anyone to easily treat any content - i.e., any intellectual information distributed throughout the world in various forms, such as images, music, and dictionaries - in any way and utilize it in a sophisticated manner.

Common reality communications technologies

Technologies that provide ultra-realistic sensations using, for example, 3-D images that create an ultra-realistic feeling; 3-D communications; and broadcasting seamless between virtual reality and reality.

Super-communications technologies

Technologies that significantly enhance human communication capabilities, allowing anyone to communicate properly by overcoming the barriers of language, knowledge, and culture; technologies that ensure the construction and automatic construction/conversion of a semantic system regardless of verbal and nonverbal; and technologies that express ideas based on conventional wisdom.

Context awareness environments technologies

Technologies that collect peripheral information through interconnections; and technologies that provide timely services as required in users' situation.

R&D in these fields of technology is being undertaken in other countries also as an important part of national policy, as part of a clear vision.

Future models of universal communications technologies

The study group investigated how these four fields of technologies will each develop in the future, and having divided the next 10 years into a period of initial stage

(to 2010) and a period of development stage (to 2015), organized the development image at the end of each time period and the technologies and functions necessary for their realization.

Also, with regard to the extent to which our lives will become richer thanks to the universal communications technologies that are fingered for realization during the period of development, the study group has selected 12 representative usage scenes and has tested examples of the main technologies necessary for their realization. For example, they aimed at the realization of 3-D television that would give the realistic sensation of being at the soccer world cup final while being in one's home.

Economic ripple effect of universal communications

The study group also carried out quantitative estimates on the social effects and economic ripple effect brought about by the realization of universal communications technologies. As a result, it estimated that the market size of_products and services incorporating universal communications technologies would reach a maximum of 50 trillion yen in 2020.

		Economic ripple effect	
		2015	2020
Economic ripple effect of universal communications	Optimistic	25.0	50.2
	Neutral	18.1	41.5
	Pessimistic	10.6	25.0
(Ref.) The size of the ubiquitous network-related market		101.0	137.5

Unit: Trillion yen

Topics for R&D and standardization and the establishment of a research system

Looking ahead to the realization of universal communications, there is a need for industries, universities and research organizations to set up research systems and promote R&D and standardization in the four technology fields mentioned above. Against this background, the government shall fill a role to create a basic policy and ensure accountability to society with the establishment of a plan-do-check-act (PDCA) cycle in an effort to build social consensus as well as proceed with the following key R&D and standardization to promote "Value Evolution in Intelligence" through a collaboration among industries, academia, and the public sector.

Measures to be taken from now on

he final report presents five policy measures on which Japanese industries, academia, consumers and the government should cooperate for the realization of universal communications.

Incentive promotion of basic R&D toward the realization of universal communications

It is necessary to promote R&D through a collaboration of all concerned, including industries, universities, consumers and the government, centered on the National Institute of Information and Communications Technology (NICT).

Strengthening of basic R&D, including the scientific elucidation of human sensation and cognizance

It is vital for the development of new technologies to accumulate basic research concerning the human sensation and cognizance mechanisms which we still understand very little. Since this type of basic research is not directly linked to commercialization, the government shall take the initiative in implementing this, including providing subsidies as competitive funds to invite public proposals.

Promoting a well-balanced sequential research process, from basic/applied research to verification experiments

In order to overcome so-called the Valley of Death and Darwinian Sea, and bring the results of research to practical and commercial use, it is necessary to be promoted on an harmonized basis through a collaboration among industries, academia, and the government in the following areas: research at the basic and germination stages at universities, etc. subsidized by competitive funds; from basic research to applied technologies at the NICT; research at industries, from basic research with commercial use within sight to commercial use; verification experiments (to enhance social acceptance) and standardization activities.

Concentration of excellent researchers full of talent on a global basis and fostering researchers to shoulder next-generation R&D

There is a shortage of researchers in terms of quality and quantity, and it is necessary for mid-level and young researchers to be strongly fostered through exchanges in the Universal Communications Forum for Industries, Academia, and the Government (tentative name), and is important to promote joint research as well as collaboration with foreign research institutes and researchers.

Establishment of a comprehensive promotion system where research outcome increases cumulatively

It is necessary to promptly establish the Universal Communications Forum for Industries, Academia, and the Government (tentative name) with a variety of participants, including researchers, telecommunications carriers, broadcasters, consumers, and government officials from Japan and overseas, and strongly promote (i) exchanges of information among people concerned and exchanges among different fields, (ii) efforts to enhance social acceptance, (iii) the implementation of joint verification experiments, and (iv) the spread of outcome to the international community.

Conclusion

MIC is promoting R&D in both a targeted and strategic way with a view to the realization of a ubiquitous network society, based on its UNS Strategic Programs.

Within this, MIC has pinpointed universal communications technologies as a priority area for the UNS Strategic Programs, along with new generation networks technologies and ICT security and safety technologies, and will continue to actively encourage R&D and standardization, in close collaboration with other priority areas.

Decision reached on an Agenda for Consideration of a Framework for Competition Rules to Address Progress in the Move to IP

On October 28, 2005, MIC convened the first meeting of the "Study Group on a Framework for Competition Rules to Address Progress in the Move to IP (chaired by Professor HAYASHI Toshihiko, the University of the Air and the Director of the Stanford Japan Center)." On December 28, 2005, the Study Group decided on an Agenda for Consideration of a Framework for Competition Rules to Address Progress in the Move to IP.

The Study Group has decided to clarify evaluation issues on future competition policy in the telecommunications business field in line with this agenda and to put in place, as far as possible, a concrete direction for the policy while maintaining a special focus on protecting the interests of users.

Basic principles concerning competition policy to address progress in the move to IP

Changes in competitive environments accompanying progress in the move to IP

(i) A framework for analysis relating to changing business models in the age of broadband
(ii) The migration process relating to an IP-based network deployment

Basic points of view on competition policy for the broadband market

(i) The relationship between service-based competition and facility-based competition
(ii) Assurance of "competitive neutrality" and "technological neutrality"
(iii) A framework for ensuring fair competition that addresses vertically-integrated business models
(iv) Protection of the interests of users
(v) Time frames for the consideration

A framework for future interconnection policy

Basic points of view concerning interconnection policy

(i) Validation of existing interconnection rules in the telecommunications business field
(ii) Flexible revisions of interconnection rules in line with changes in market competition
(iii) A framework for market dominance and assuring fair competition in a vertically integrated business model

A framework of a designated telecommunications facilities system

(i) A structure for a designated telecommunications facilities system
(ii) The coverage of Type 1 designated telecommunications facilities

A framework for calculating interconnection charges
(i) A framework for calculating PSTN interconnection charges
(ii) A framework for a forward-looking cost method
(iii) Other considerations

A framework for Fair Competition Assurance Requirements in the Designated Telecommunications Facilities System
(i) A framework for behavioral regulations associated with the designated telecommunications facilities system
(ii) A framework for fair competition requirements from the NTT Group

Responding to the diversification of interconnection forms
(i) Reviewing interconnection forms that address the move to IP
(ii) A Framework for promoting new MVNO entrants

A Framework for Establishing of an Environment for Next-Generation Network Construction

A framework for future tariff policy

Basic points of view concerning tariff policy
(i) Validation of previous tariff policies in the telecommunications business field
(ii) Issues that are deemed to require revision (or maintenance) based on the changes in market environment

A framework for price cap regulations
(i) Validation of price-cap regulations
(ii) The need for revision of price cap regulations

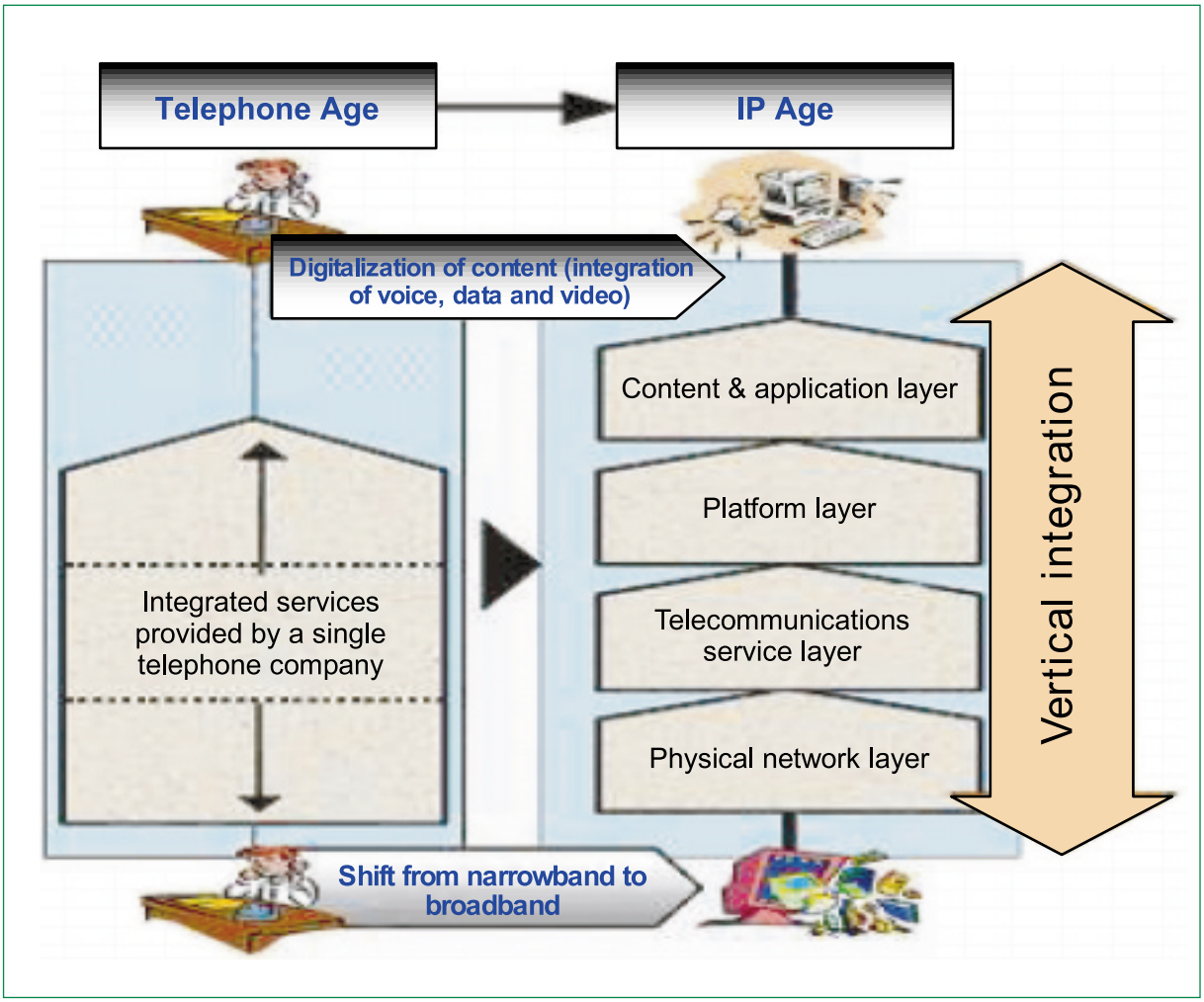
Approach to new tariff policy
(i) The need for a tariff policy that addresses diversification of business models
(ii) Other issues that should be considered concerning "approach to new tariff policy"

Other Policy Issues

A Framework for Cost-Sharing to Enhance Communication Networks

Other competition policy-related issues for examination

For further information about this agenda, please refer to the following
http://www.soumu.go.jp/joho_tsusin/eng/Releases/Telecommunications/news051228_1.html#b



No Effects on Melatonin Synthesis (Hormone Inducing Sleep) in Brain Confirmed

—Research results from "Committee to Promote Research on the Possible Biological Effect of Electromagnetic Fields"

Since FY1997, MIC has been holding a "Committee to Promote Research on the Possible Biological Effect of Electromagnetic Fields" (Chair: Prof. UENO Shoogo, Department of Biomedical Engineering, Graduate School of Medicine, the University of Tokyo) for promoting studies and investigations of the biological safety evaluation of radio wave.

In order to measure effects on sleep caused by radio waves emitted from mobile phone handsets, the committee conducted RF exposure experiments for clarifying effects on melatonin synthesis in the brain by exposing rats' brains to radio waves. Melatonin is a natural hormone, mainly synthesized and released by the pineal gland within the brain, and regulates the body's wake/sleep/wake cycle. As a result of the experiments, the committee affirmed that even if the brain is exposed to radio waves of average SAR 7.5 W/kg, there is no effect on melatonin synthesis.

Approach to safety in radio waves

In recent years, wireless system devices such as mobile phones have come to play an increasingly important role in daily life, but as the usage of radio waves in a confirmed environment expanded,some people have grown concerned as to whether the radio waves emitted by these devices were having a harmful effect on the human body. It therefore has become a major issue to ensure that people can use radio waves safely in a secure environment.

MIC's approach to the safe use of radio waves was to formulate "Radio-Radiation Protection Guidelines" and to evaluate safety so that there would be no undesirable organic effects on the human body in using radio waves. At the same time as setting up this system, MIC set up the Committee to Promote Research on the Possible Biological Effect of Electromagnetic Fields in 1997 so as to further clarify the effects of radio waves radiation on the human body, promoting research from both the medical and engineering points of view. Additionally, there are Press Release efforts in order to disseminate accurate information on the effects of radio waves radiation on the human body, including the production and distribution of pamphlets, and lectures.

The website concerning radio wave environment can be found at:
http://www.tele.soumu.go.jp/j/ele/index.htm
The pamphlet entitled "Radio waves and secure life" can be found at:
http://www.tele.soumu.go.jp/j/ele/body/emf_pamphlet.pdf
Information on lecture schedules can be found at:
http://www.tele.soumu.go.jp/j/ele/body/pr/lecture.htm

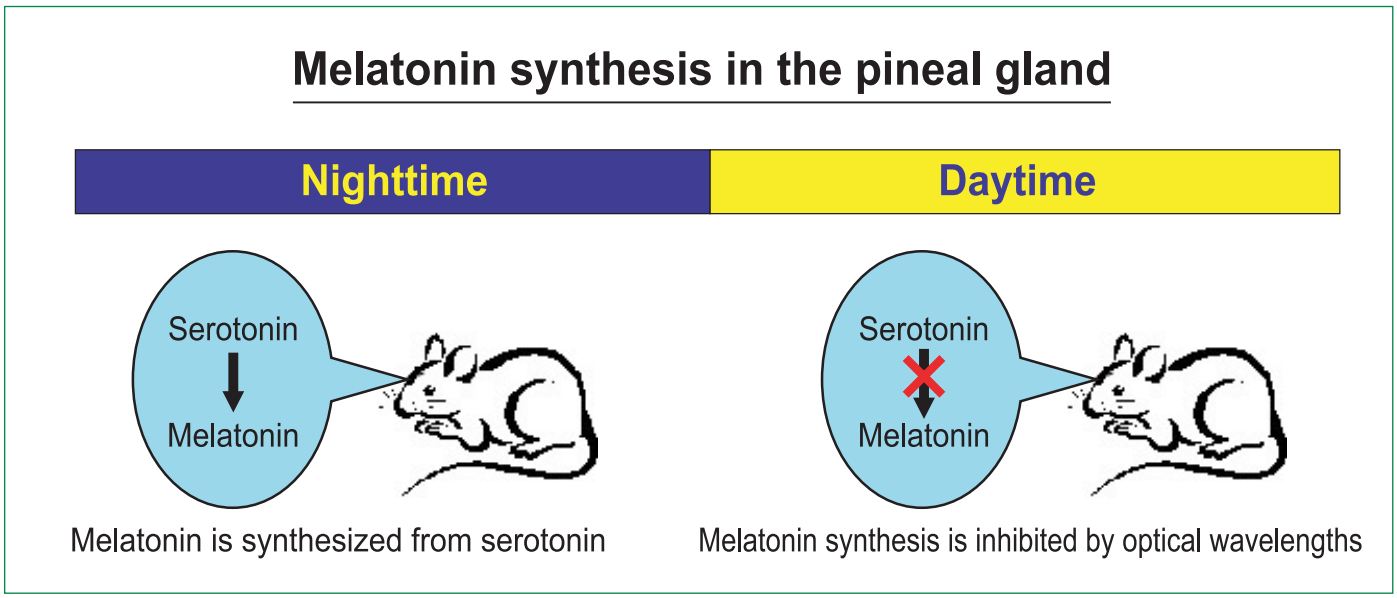
Approaches for more safe and secure use of radio waves

- Formulation and establishment of the radio-radiation protection guidelines
- Promoting research on the effects of radio waves on the human body
- Information and Press Release through website, pamphlets and lectures

Results of current research

Melatonin is an ataractic hormone synthesized from serotonin (a neurotransmitter which is synthesized from tryptophan, an amino-acid essential in food consumption) in an organ called the pineal gland located in about the center of the brain. It operates on the sleep/wake/sleep cycle (more is produced at night to induce sleep) and has anti-oxidant and anti-tumor properties.

In order to study the effects of radio waves emitted by mobile phone handsets, the committee conducted a study to clarify the effects of radio waves radiation from mobile phones on melatonin synthesis by exposing rats' brains to radio waves radiation and studying the levels of melatonin and serotonin in the pineal glands and serum.



In the experiment, 408 rats that had been acclimatized for over two weeks to 12 hours each of light and darkness were placed in radio wave exposure equipment. One group (exposure group) was exposed to radio waves radiation, a second (pseudo-exposure group) was placed in the equipment but not exposed, a third (non-exposure group) was neither placed in the equipment nor exposed to radio waves radiation, and a fourth group (light exposure group)*1 was exposed to light under daytime conditions. A comparison was then made of levels of melatonin and serotonin in the pineal gland and serum of the exposure group and other groups.

The brain average SAR count of the radio wave radiation used on the radio wave exposure group was 7.5W/kg, which was several times than the standard level*2 set out in the radio-radiation protection guidelines. The exposure was conducted in FY2002 and FY2003 over single four-hour periods in order to evaluate the effects of short-term exposure. In FY2004, the exposure was conducted over a four-week period at the rate of one hour a day, in order to evaluate mid-and-long term effects.

In all cases, as it is known that melatonin synthesis is strongly inhibited by optical wavelengths, exposure to radio wave radiation to the exposure group was exposed under the condition of darkness, and the pineal gland extraction and serum collection from the exposure, pseudo-exposure and non-exposure groups were also carried out under the condition of darkness, so as to minimize the effects of optical wavelength as much as possible.

Notes:
*1: The light exposure group was set up in order to verify that the measurements of FY2002 and FY2003 were conducted correctly.
*2: The SAR count of any organ for 10g of is not above 2W/kg (average value for 6 minutes)

Animals tested

FY2002 Rats 10-12 weeks old-male 104

Exposure group	32
Pseudo-exposure group	32
Non-exposure group	32
Light exposure group	8

FY2003 Rats 10-12 weeks old-female and male 208

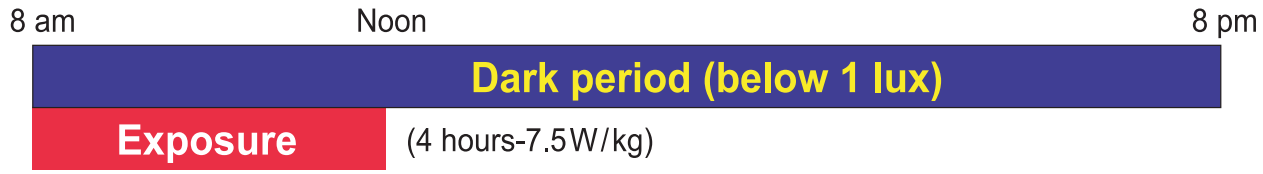
Exposure group	32 females	32 males
Pseudo-exposure group	32 females	32 males
Non-exposure group	32 females	32 males
Light exposure group	8 females	8 males

FY2004 Rats 10-12 weeks old-male 96

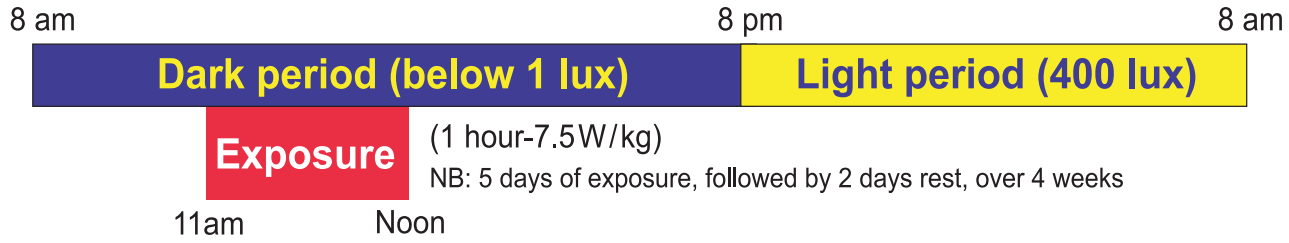
Exposure group	32
Pseudo-exposure group	32
Non-exposure group	32

Conditions of radio wave radiation exposure

(1) Radio wave radiation exposure conditions for experiments on short-term exposure (FY2002 and 2003)



(2) Conditions of radio wave radiation exposure for experiment on mid-and-long term exposure (FY2004)



The results of the experiments showed no significant differences in the levels of melatonin and serotonin in the pineal gland and serum among the three groups (exposure, pseudo-exposure and non-exposure). From the above results, it was ascertained that the radio waves emitted by mobile phone handsets do not have an effect on the melatonin synthesis which is closely connected to the body's sleep/wake/sleep cycle.

These results were presented at the 28th Annual Meeting of the Bioelectromagnetics Society, Washington, D.C, 2004 and published in Bioelectromagnetics magazine (26(1): 49-53, 2005).

Experiments on the effects on sleep (FY 2002 to 2004)

There is no evidence of effects from radio waves generated by mobile phones on the melatonin synthesis in the brain.

For details concerning these experiments, please refer to the research papers (PDF).

Future plans

In order to secure an environment in which radio waves can be used more safely and securely, the committee will continue to promote the research that is needed to further clarify the effects of radio waves radiation on the human body. This will be done by implementing both medical and biological studies such as epidemiology studies on the relationship between use of mobile phone handsets and the occurrence of brain tumors, and studies on the clarification of the effect on eyeballs by the radio waves radiation. In addition, studies are being implemented concerning dosimetry, such as evaluations using a more precise model than the one used at the time of establishing the radio-radiation protection guidelines concerning the relationship between the electricity absorbed by the human body when exposed to radio waves radiation (average SAR - (Specific Absorption Rate) for the body) and the strength of the radio wave radiation.

Preparation of Provisions for Advancement of Emergency Reporting

—Council Report on "Regulations for Telecommunications Facilities for Telecommunications Business" and Public Comments Thereon

On December 20, 2005, MIC received a report from the Information and Communications Council (Chair: Mr. SHOYAMA Etsuhiko, President and CEO, Hitachi, Ltd.) describing that it is appropriate to prepare the draft MIC ordinance to amend part of the "Regulations for Telecommunications Facilities for Telecommunications Business (Ministerial Ordinance of MPT No. 30 of 1985)" as inquired.

MIC will, paying due respect to the report and nine public comments received during the period from October 25 through November 24, 2005, amend part of the applicable MIC ordinance and part of the applicable MIC notice without delay.

Background to the amendments

Taking into consideration mobility of cellular telephones, cellular telephones must be able to provide more detailed location information to emergency organizations (police and fire departments). In addition, with respect to IP telephony, it is necessary to ensure that interconnection of emergency calls with various IP-based networks are constructed in the future.